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U N I V E R S I T Y O F A R K A N S A S

RESEARCH FRONTIERS

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FALL 2012

FINDING the PAST in a POINT CLOUD

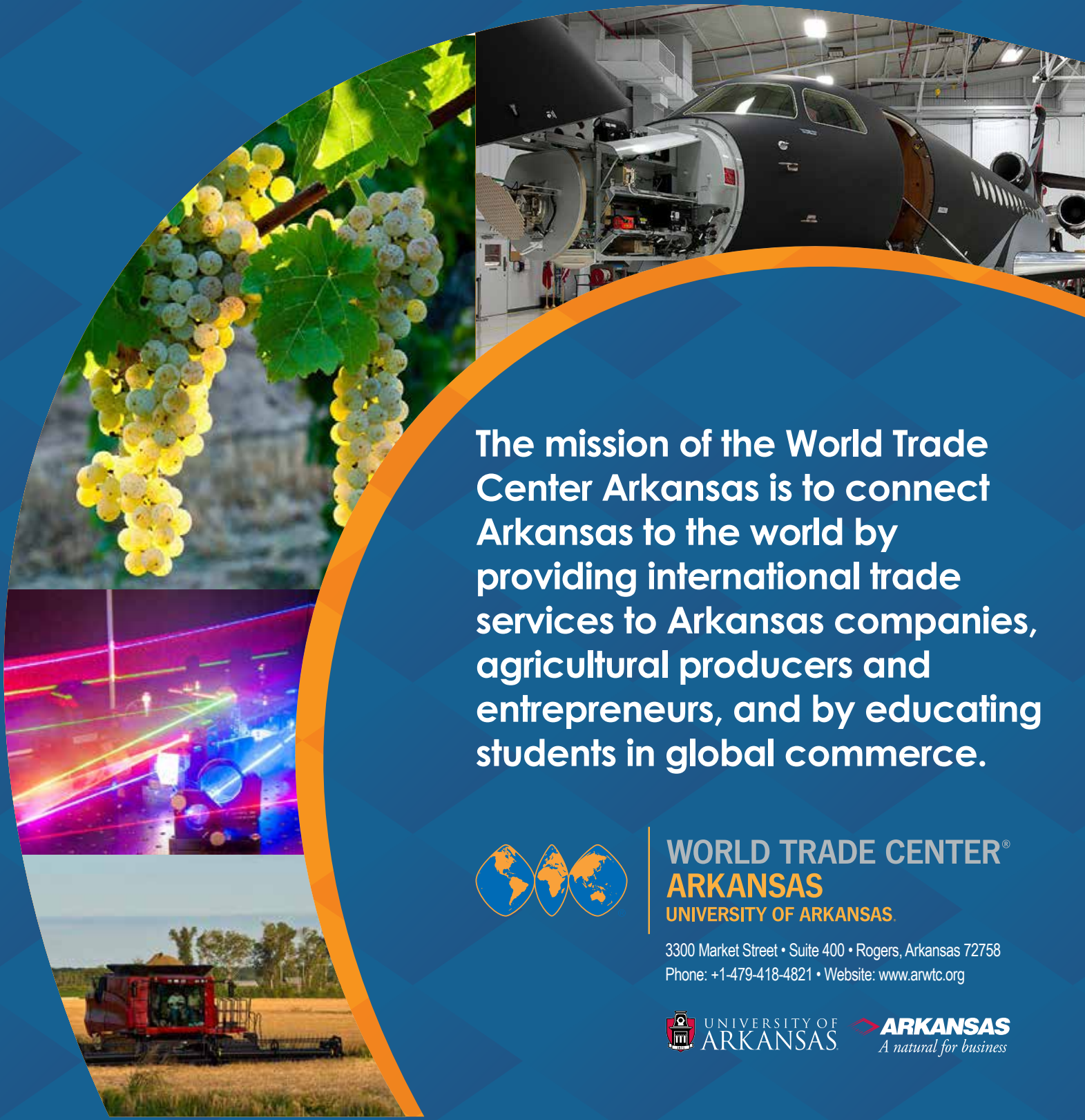


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ΨΥΧΗΣ ΙΑΤΡΕΙΟΝ: Healing Place of the Soul

By Barbara Jaquish



One evening in May 2012, classics professor Daniel Levine spoke at the public library in Fayetteville, Ark., about what the ancient Greeks can tell us about returning warriors and the people who wait for them.

“Ancient Greek literature is a useful tool to help understand the struggles of modern war veterans, because ancient war veterans, who know from firsthand

personal experiences what it was like to fight and be away from home for long periods of time, composed most of it,” Levine said. “Their anxieties and struggles, expressed in ancient epics and tragedies, resonated with their audiences, which were mostly made up of combat veterans. The actors on the Greek tragic stage were mostly combat veterans, too.”

Levine’s talk was part of Ancient Greeks/Modern Lives, a project hosted by 100 public libraries, art centers, theaters and museums across the country. In the weeks that followed, Levine led a series of discussions that involved veterans, their families and others, responding to works by Homer, Aeschylus, Euripides and Sophocles.

“I like the logo of the Ancient Greeks/Modern Lives program,” Levine said, “because it shows in one picture that we modern folk have in our heads many of the same thoughts and feelings that the Greeks did.”

Retired teacher Annee Littell attended and appreciated hearing veterans’ experiences. “From reading the Greek plays, which were delightful, it seems that fighting seemingly endless wars is nothing new, and the homecoming of many of their fighters were also fraught with peril, betrayal, loss of wives and children, and suicide.”

“Modern soldiers, like their ancient Greek predecessors, had to spend long periods away from home. They left wives and small children behind, about whom they constantly worried. The tensions of these long separations take various tolls,” Levine said. “Ancient Greeks told stories about how the folks on the

home front miss their fellow citizens who are away at war, often not knowing if they are alive or dead; they told stories about the terrible conditions of being in the field, and of soldiers’ violent acts on the battlefield and off it – including frenzy, suicide and murder. But we also see the joy that veterans take in returning home after a long absence.”

For example, Homer’s *Odyssey*.

“The *Odyssey* is an incredibly rich source of thoughts on what it means to come home after a long separation, about a wife needing her husband and a son needing his father,” he said. “It details a soldier’s unyielding determination to return to his family after years of war. It is amazing to me how much of human life this poem reflects, and how it does so truly and movingly; it’s so rich in so many ways.”

Bill Speer, a retired Army officer who attended, said the program “reminds all of us that our determined warriors should be our most compelling anti-war figures, not due to their activism but due to the tasks they may perform and the consequences of those tasks.”

The public library was an appropriate place for thinking about such complex experiences. Inscribed over the door of the ancient library in Alexandria were the words ΨΥΧΗΣ ΙΑΤΡΕΙΟΝ or “Healing Place of the Soul.” Levine translated a passage from Hesiod’s *Theogony*, in which the Muses, who inspire bards to sing tales about the epic past, can make people forget their troubles:

“And he whomever the Muses love is happy, and sweet speech flows from his mouth. For if anybody, even one having sorrow, is groaning as he grieves in his newly-mourning heart, nevertheless if a singer, a servant of the Muses will sing the glorious deeds of earlier men and of the blessed gods who hold Olympus, quickly that grieving man will forget his troubled thoughts and he will not remember his problems, but quickly the gifts of these goddesses turn them away.”

Levine is the chair of the Classical Studies program at the University of Arkansas. His opening talk is available at <http://researchfrontiers.uark.edu/1710.php> on the Research Frontiers website.

Photo by Russell Cothren

An extract from pea plants spins in Robyn Goforth’s lab.



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UNIVERSITY OF ARKANSAS RESEARCH FRONTIERS

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See history in a data point cloud. A landscape architect and geospatial specialists are mapping what remains of a World War II internment camp for Japanese-Americans. In 1945, the camp covered 500 acres in the Arkansas Delta. Today, a small cemetery in the midst of cotton fields holds monuments and memories.

14 Surviving a Meat-Sweet Desert

Obesity is just one of the things that happen to people who don't have ready access to a grocery store. At a Science Café, a nurse, a dietitian and a food science researcher brought their expertise to a discussion of the American diet and what can be done.

20 Seeking Multicellularity

Have you ever wondered why biologists *should* think about sex all the time? Hint: It's not just so they can spy on the sex life of slime molds. Rather, it's all part of understanding the complexity of multicellularity. Let us explain.

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Follow five entry-level entrepreneurs with a vision through long nights in stuffy rooms as they prepare for the business plan competitions that could bring investors their way. In their corner is a powerful ally and mentor, Carol Reeves, director of the Walton College entrepreneurship program.

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Dwindling Delicacy: Tuna

At a time when the tuna population is dwindling worldwide, classics professor Daniel Levine discusses the exalted place of tuna in the lives of Mediterranean people in the ancient world. Read all about it: <http://researchfrontiers.uark.edu/17102.php>



Myth Meets Metaphor

Luke Knox explores animal mythology and metaphors in his art, making unexpected connections that say stop a moment and contemplate. Visit: <http://bit.ly/MythMeetsMetaphor>



Galaxy People!

What happens when a physics grad student spends many, many hours gazing at galaxies? If the student is Doug Shields, he turns to poetry: Visit: <http://bit.ly/GalaxyPeople>



Stored in the Rings

Watch dendrochronologists pull samples of history from the core of a tree: Visit: <http://bit.ly/TreeRings>



Small Cemetery – Big Story

More than 8,000 Japanese-Americans were relocated during World War II to an internment camp in Rohwer, Ark. Today, University of Arkansas researchers use traditional tools and advanced technology to map the camp's cemetery, a plot smaller than an acre. Visit <http://bit.ly/Rowher>



Deploying Harmony to Save Parks

According to University of Arkansas researcher, Gregory Benton, park interpreters can design programs to minimize negative effects from outside visitors to parks and educate visitors for the future.

Benton, an assistant professor in recreation and sports management, relates his research to the Hawaiian concept of “pono,” which means living in harmony and righteousness with the environment and incorporating the values of cultural equality and natural resource stewardship.

He studied sites in Arkansas, New Mexico and Georgia where interpretive programs are conveying positive goals of cultural and natural resource agencies. For example, fifth-grade science students from an elementary school in Springdale, Ark., took field trips over a six-month period to a nearby state park. The program was designed to immerse young people in the forest environment to help their generation maintain collective knowledge of the importance of the outdoors so they could pass it on to the next generation.

He identified three things that could minimize negative damage to parks in the programs he studied: preservation of tangible and intangible indigenous culture, modifying recreation behavior to maintain natural resource quality, and exposing children to values



Fifth-grade students learn about the forest environment at Hobbs State Park – Conservation Area in northwest Arkansas.

that promote harmony through interpretive immersion in nature.

“Interpretive programs not only connect visitors to resources but are able to dispel indigenous myths and carry messages regarding the balancing of freshwater recreation for the sake of maintaining the integrity of the natural resource,” Benton said.

Is Our First Response ‘Right’?

Low-effort thought – including rapid, distracted or intoxicated reactions – tends to coincide with conservative ideology, according to recent studies by psychologist Scott Eidelman and colleagues.

In one field study, bar patrons were asked their opinions about several social issues before blowing into a Breathalyzer. Whether the individual self-identified as liberal or conservative, higher blood alcohol levels were associated with endorsement of more conservative positions.

In a lab experiment, some participants were asked to respond quickly to political ideas, while others had ample time to respond. In another survey, some participants were able to concentrate while responding to political statements, while others were distracted. In both lab experiments, participants with less opportunity to deliberate endorsed conservative ideas more than those who were able to concentrate.

The researchers stressed that their results should not be interpreted to suggest that conservatives are not thoughtful.

“Everyone uses low-effort thinking, and this may have ideological consequences,” they write. “Motivational factors are crucial determinants of ideology, aiding or correcting initial responses depending on one’s goals, beliefs and values. Our perspective suggests that these initial and uncorrected responses lean conservative.”

Eidelman collaborated with Christian Crandall of the University of Kansas; Jeffrey A. Goodman of University of Wisconsin, Eau Claire; and John C. Blanchard, a University of

Arkansas graduate student, on studies reported in “Low-Effort Thought Promotes Political Conservatism,” which was published online in *Personality and Social Psychology Bulletin*. Read more at University of Arkansas Newswire, <http://newswire.uark.edu/Article.aspx?ID=18125>.



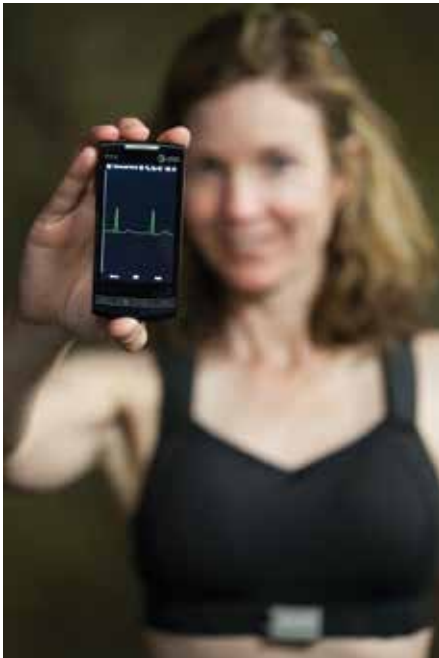
Green is Growing in the Hospitality Industry

Would you pay more to stay in a hotel that took steps to be “greener?” If you said “yes,” then Godwin-Charles Ogbeide, believes that you are not alone. His recent study, “Perceptions of Green Hotels in the 21st Century” has earned him the Resort and Commercial Recreation Association’s 2011 Excellence in Research Award.

Ogbeide, an associate professor of hospitality and hotel management, found that most consumers are inclined to stay at hotels that take steps to be environmentally sustainable. He cited three categories that matter most to consumers – water conservation, energy conservation and waste reduction – and that are also the biggest concerns for hotel managers. Going green does not have to be expensive in the short run, and in the long run green hotels save money. Green could become the norm.



“Right now we have smoking rooms and non-smoking rooms in some hotels. As time goes on, hotels may have ‘green’ rooms and ‘non-green’ rooms,” Ogbeide said.



Monitoring Health: Nano & Smart

Imagine a wireless health-monitoring system that monitors blood pressure, body temperature, respiratory rate, oxygen consumption and heart activity, regardless of the patient’s location.

An interdisciplinary team of engineers has developed just such a system. Via a lightweight and wireless module that snaps onto clothing garments, sensors communicate with system software that relies on a smart phone to collect information, compress it and send it over a variety of wireless networks.

“Our e-bra enables continuous, real-time monitoring to identify any pathophysiological changes,” said Vijay Varadan, Distinguished Professor and George M. and Boyce W. Billingsley Endowed Chair in Engineering. “It is a platform on which various sensors for cardiac-health monitoring are integrated into the fabric. The garment collects and transmits vital health signals to any desired location in the world.”

The sensors, which are smaller than a dime, include gold nanowires as well as flexible, conducting textile nanosensors. Data from the sensors then stream to commercially available cell phones and hand-held devices, which expand the use of the system beyond health care. By carrying a cell phone, athletes can monitor all signs mentioned above and other metrics, such as number of calories burned during a workout.

The system can also be programmed to send emergency messages, via voice or text messaging, if it detects extreme or abnormal conditions. See and read more at University of Arkansas Newswire, <http://bit.ly/NanoSmart>.

Hemingway and Piggott, Arkansas: The Untold Story

Unbelievable Happiness and Final Sorrow, published by the University of Arkansas Press, is a biography of Ernest Hemingway’s private life and the role one woman played in his becoming one of the greatest literary figures of our time.

The author, Ruth Hawkins, writes about the most prolific period of Hemingway’s life. She dissects Hemingway’s relationship with his second wife, a relationship that has been overlooked in writing until now, yet one that contributed to significant growth in Hemingway.

His second wife, Pauline Pfeiffer, a stylish journalist for *Vogue*, came from a wealthy family. The two built a strong connection, causing the breakup of Hemingway’s marriage to his first wife, Hadley Richardson. In 1927, Hemingway and Pfeiffer were married and moved to America, where Pfeiffer became the source of “unbelievable happiness” for Hemingway.



She was her husband’s best editor and critic, and her family offered Hemingway monetary and moral support. He took full advantage of it, using it for his increasingly profitable writing, extensive travel, heavy drinking and expensive recreational pursuits. *Unbelievable Happiness and Final Sorrow* reveals the importance of Hemingway’s relationship to the entire Pfeiffer family.

Their marriage lasted 13 years, and produced two children. However, their “unbelievable happiness” met with “final sorrow,” as Hemingway wrote. Hemingway moved on, no longer in need of Pfeiffer money.

Hawkins is an administrator at Arkansas State University. More about Unbelievable Happiness and Final Sorrow is available from the University of Arkansas Press (<http://www.uapress.com/titles/sp12/hawkins.html>).

Tartar Tells ... Two Million Years Later

Two-million-year-old tartar reveals what at least one pair of early hominins ate: plants.

In 2010, anthropologist Lee Berger of the University of the Witwatersrand in Johannesburg, South Africa, and colleagues discovered the remains of an elderly female and young male that had been covered in sediment almost two million years ago. A team of scientists has studied these remains, specifically the teeth, which proved to have unique properties because of how the hominins died.

“We have a very unusual type of preservation,” according to Peter Ungar, Distinguished Professor of anthropology. “The state of the teeth was pristine.”

Since the individuals were buried and quickly encased in sediment, parts of the teeth were preserved with a pocket of air surrounding them. Researchers performed dental-analysis on these well-preserved teeth and discovered areas of tartar buildup and plaque. They found phytoliths, bodies of silica from plants eaten almost 2 million years ago.

“It’s the first time we’ve been able to look at these three things in one or two specimens,” Ungar said.

The phytoliths, dental microwear, and isotope analysis gave an even clearer picture of what the hominins were consuming: bark, leaves, sedges, grasses, fruit and

palm. This result differs from other evidence seen in australopiths, because, Ungar said, “A lot of the other creatures there were not eating such forest resources.”

Additionally, he said, “These findings tell us a really nice story about these two individuals. It’s fascinating that we found something that went into the mouth of these creatures that was still in the mouth of these creatures.”



Photo by Brett Eldor. Courtesy Profberger and Wits University



“Nearly 50 percent of the total antioxidants found in grapes are located in its pomace.”



Photos by Jack Frost

Left to right, Keerthi Srinivas and Jerry King use a modified expeller to extract antioxidants from grape pomace; Grape pomace is made up of left-over skin, seeds and stems; Srinivas examines the color of a water-based extract of antioxidants.

PUTTING THE Squeeze ON POMACE

By Noel Feldman

The United States juice and wine industries produce 10 to 15 million tons of grape waste each year. This waste, known as pomace, is usually sent to landfills, fed to livestock or used to make a renewable biofuel. But a group of researchers at the Engineering Research Center and the department of food science think there may be a better use for the leftover grape skin, seeds and stems.

The researchers spent more than four years studying grape pomace and came up with an eco-friendly and health-enhancing way to use the typically discarded material.

Chemical engineering professor Jerry King and food science professor Luke Howard used funding from a multi-year U.S. Department of Agriculture grant to support the research project, and each recruited a doctoral student to assist them in attaining its objectives. King selected Keerthi Srinivas, a Doctoral Academy

Fellow, who at the time was just beginning his journey toward a doctorate in chemical engineering.

King and Srinivas, along with their co-workers, developed an antioxidant extraction technique using hot water under pressure that allowed the removal of bioactive and health-benefitting compounds called flavonoids from the pomace. Nearly 50 percent of the total antioxidants found in grapes are located in its pomace.

Flavonoid antioxidants are thought to aid in the prevention of certain illnesses and help promote general wellness. They counteract the production of harmful and unstable molecules called free radicals that, when prevalent in a living being, can lead to heart disease and certain cancers. Extracting antioxidants from food waste allows them to be combined into a variety of foods, vitamins and skin products.

“All fruits and vegetables and many food sources have amounts of these flavonoids that are destroyed in conventional processing,”

King said. “Our method allows them to be removed and permits the leftover pomace to be used for other purposes.

“By using water at a lower pressure and temperature you can preferentially extract from the pomace these nutraceutically active components – or antioxidants,” King said. “Then, the pomace material that remains can be treated at a higher temperature and pressure to make certain kinds of products – such as a renewable biofuel.”

Using water as an extraction medium is a safer alternative to the more commonly used flavonoid solvents that contain ethanol. The consumption and use of ethanol is highly regulated by the U.S. government when used in extraction processes. Water, on the other hand, quells these concerns and is abundant, cheap and environmentally benign.

“If we could replace the use of hydroethanolic solvents with water, it would ease the regulatory requirements and have financial benefits to the food and nutraceutical markets,” Srinivas said. “I think we have established a platform that has expanded the use of water as a solvent.”

King and Srinivas worked from 2006-2010 experimenting with different water temperature and pressure conditions. The research extended beyond Srinivas’ doctoral education and led him to apply for a post-doctoral fellowship under King so he could continue his work from 2010-2012. Much of this research involved finding an extraction technique that maximized antioxidant output.

The grape pomace research has resulted in more than 10 published articles in engineering and food science journals, as well as a large number of presentations and collaborative opportunities. For Srinivas, an up-and-coming researcher, the experience of writing peer-reviewed articles and making presentations was invaluable.

“Dr. King provided me with a considerable number of opportunities where I was required to take responsibility and complete tasks with deliberation, punctuality and a high degree of perfection,” Srinivas said. “The opportunities included writing book chapters, presenting at conferences, writing grants to industrial and government agencies, publishing papers and attending workshops.”

The fact that Srinivas was so highly published in peer-reviewed journals as a student is a rare and important accomplishment. Oftentimes, graduate students produce only their thesis and aren’t published until later in their professional lives.

“Unfortunately this is often the case in graduate school,” King said. “But, with my assistance, he produced 15 peer-reviewed publications from his combined graduate school and postdoctoral experience at the University of Arkansas, with even more to come.”

Since the conclusion of the grape pomace research, Srinivas has moved on to a post-doctoral fellowship at Washington State University where he is conducting similar water-related research in their Richland, Wash., laboratories.

From 3-D to 2-D:

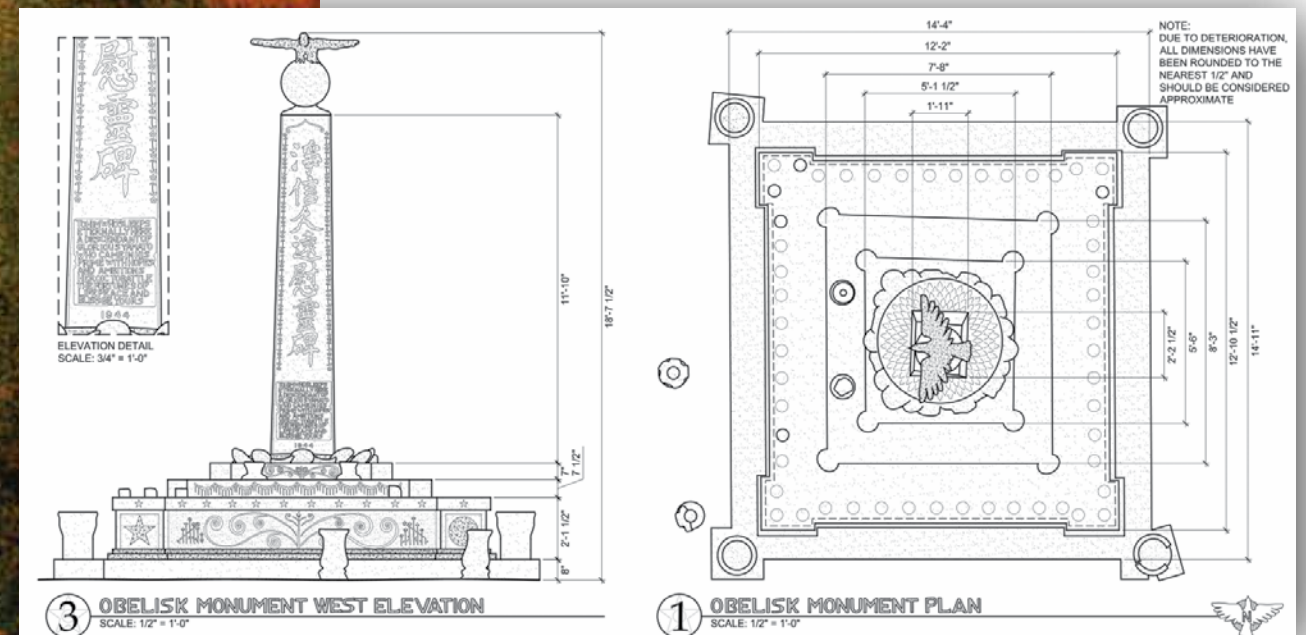
Mapping the Forgotten History of a Japanese-American Internment Camp

By Holly Hilburn

In an unexpected union between landscape architects, historians and technology gurus, a small but significant cemetery, which saw its last burial well over 60 years ago, is receiving some long overdue attention.

After Japan attacked the United States naval base at Pearl Harbor on Dec. 7, 1941, Japanese-Americans living on the West Coast were victims of racial profiling, because of fear they could be potential spies or conspirators for a Japanese invasion. Though there was no proof that Japanese-Americans were guilty of any attempted sabotage, President Franklin D. Roosevelt signed Executive Order 9066, uprooting more than 120,000 Japanese-Americans – the majority of whom were United States citizens – and forcing them to relocate to 10 different internment camps around the country. Two of these camps, Rohwer and Jerome, were located in Arkansas.

Remembering Rohwer



FINDING the PAST in a POINT CLOUD (Left) Laser scanning produced a three-dimensional representation of the site. Every time the laser encountered a surface, it recorded a distance as a point. Taken together, the points produce a 3D point cloud, the recording of millions of points that precisely plot the shapes within the site and document the most minuscule details of headstones and monuments in the Rohwer cemetery. (Above) Kimball Erdman's landscape architecture class used CAST's data to produce detailed drawings of monuments.



Photo by Hiden Iwasaki

A resident of the Rohwer camp views the grave of a relative buried in the cemetery, June 16, 1944.

Rohwer, a small farming community in the southeastern portion of the state, was the location of the last of all the camps to remain in operation. Opened in September 1942 and closed in November 1945, more than 10,000 internees passed through its grounds, with as many as 8,475 living there during its peak. What used to be 500 acres with 620 buildings divided into 51 blocks is now reduced to a small cemetery and a distant smokestack, all that remains of the camp's laundry. In the cemetery, only 24 weathered gravestones and four monuments remain to serve as a reminder of this significant story in American history.

"May the people of Arkansas keep in beauty and reverence forever this ground where our bodies sleep," reads one monument in Japanese. Built in 1945 and erected by the internees themselves, this memorial stands to honor the 186 people who died while living at Rohwer. Today, seven decades after the camp was dismantled, three of the state's universities are teaming up to honor this long ago request.

"It's a nationally significant project we're blessed to be a part of," said Kimball Erdman, assistant professor of landscape architecture at the University of Arkansas and head of the effort to survey and document the Rohwer site. Erdman, who has spent his career studying, preserving and planning for culturally significant landscapes, first got involved with Rohwer in spring 2011, seeing it as an opportunity to both explore new technologies and preserve a meaningful piece of history.

"That's really what this program is about – raising awareness and protecting what remains of these sites – because frankly very little has been done until now," he said.

Documenting Rohwer is part of a larger conservation effort being led by Johanna Miller Lewis, graduate coordinator for the masters in public history program at the University of Arkansas at Little Rock. Lewis received a National Park Service Grant to restore the Rohwer cemetery, and together with help from the University of Arkansas and Arkansas State University, is working to map, restore and stabilize the site.

Traditional and Technical Tools Combined

The University of Arkansas is charged with completing a report for the Historic American Landscapes Survey, which, Lewis said, will be "extremely important to how the architect approaches conservation and stabilization." To conduct the survey, landscape architecture collaborated with the university's Center for Advanced Spatial Technologies.

"It's a relationship that's really developed in the past year," said Robyn Dennis, a geospatial education and research specialist for CAST. "For landscape architecture particularly, GIS technology is becoming more and more needed, and that's where we come in."

Dennis, who holds a bachelor's in landscape architecture, master's in geography and doctorate in environmental dynamics, was first approached by Erdman in early fall 2011. Always eager to share and make known CAST's resources, she, along with Caitlin Stevens, laser scanning specialist for CAST and graduate of the university's architecture program, began meeting with Erdman to discuss how the center's technologies could be applied to the Rohwer project. Erdman was set to teach the university's first historic landscape preservation class in the spring and wanted his students to experience new tools and methods when working on the documentation of Rohwer.

"Because of the tools CAST has, I saw it as an opportunity for the students to explore new technologies rather than just using conventional hand tools to document and survey the site," Erdman said. CAST's advanced equipment, purchased with funds from two National Science Foundation grants, could promise data that was accurate and of the greatest detail.

"Traditional researchers tend to think that people who go out and press a button to scan a site are disconnected from the site because they don't have to sit and measure everything and study it so intensely," Stevens said. "We say that we can use these things together – traditional methods and technology. There doesn't have to be this disconnection."

After months of planning, the project took off in January 2012. Dennis and Stevens accompanied Erdman and seven students to Rohwer, a five-hour haul from Fayetteville, in a 14-passenger van holding a half million dollars worth of equipment and towing a 50-foot lift behind.

The CAST equipment included two types of laser scanners, the high resolution Z+F 5006i scanner and the lower resolution Leica C10 scanner, and two types of GPS units, a survey-grade GPS and mapping-grade GPS. While Erdman and his students moved through the site with the handheld mapping-grade GPS units, Dennis and Stevens set up the survey GPS and laser scanners to take measurements at dozens of locations throughout the cemetery.

The goal of the on-site visit, Erdman said, was to get both an overall sense of the character of the cemetery and document the

Stevens used the C10 Scan Station to acquire the 3D point cloud. From high up in the lift, CAST technologists collected about 10 scans.





Henry Sugimoto, Rohwer Camp, ca. 1943, Gift of Madeleine Sugimoto and Naomi Tagawa, Japanese American National Museum (92.97.85)

"Rohwer Camp (Thoughts of Loved Ones)" by Japanese artist Henry Sugimoto, who was incarcerated in Jerome and Rohwer. More views of his collection are available on the website of the Japanese American National Museum, <http://www.janm.org>.

most miniscule details of the headstones and monuments that remain.

"When we were mapping where the monuments were, we were mapping not just their location but the names on the gravestones, conditions of the gravestones and dates of death, so that you could actually look at this and create a sort of 3D virtual tour," something made possible by the laser scanners, Dennis said.

"With the GPS, you're locating specific points and paths in the site, whereas the laser scanning is making a three dimensional representation of the site," Stevens explained. "Every time the laser encounters a surface, it records a distance as a point. You end up with what's called a 3D point cloud, which is the recording of millions of points."

The challenge for Erdman and his class now, Stevens said, is to take this point cloud and translate it into two-dimensional drawings as required by the Historic American Landscape Survey and the Library of Congress, where it will be stored.

"What we are doing is creating a site plan of the cemetery and detailed views of the major monuments according to how they look now," Erdman said. "The HALS document is an inventory

of the present and an analysis of how the site has evolved to its present state. Making plans for the future of the site goes beyond the scope of this grant."

But what of Rohwer's future?

Today, the site appears very different from what it did in its time of operation. Where there used to be sidewalks between close-quarter barracks, surrounded by barbed wire fences and machine gun towers, there is now a lone smokestack and a cemetery of deteriorated headstones in the midst of crepe myrtles and actively plowed farmland.

"Which, if you think about it, that's a very different character than what it was historically," Erdman said. "The barbed wire, especially, created a really powerful message, I think, in terms of what the camp was really like."

Deciding the appropriate treatment for the future of Rohwer is something both Erdman and the CAST researchers said they would like to be involved in. Though reversing Rohwer to its original state is probably an impractical feat, Dennis and Stevens

advocate the creation of a three-dimensional archive, so that the cemetery could be explored online, and all of its data, including names and dates on headstones, could be accessed with a click of a mouse.

"I would love to see, eventually, a virtual tour of the site," Dennis said. "I think it would be really interesting to be able to integrate a visualization of how the camp looked at the time it was operating."

Erdman cautions that "decisions should not be made without careful study through the cultural landscape report process," something he says is "another project for another time."

"This is still a very sensitive subject because there are people alive today who remember when the internment camp was there," Dennis said. "There was a lot of distrust not because the internees were Japanese but because they were actually better housed and cared for than a lot of the locals."

But plenty of surviving internees would contend that life was not much better inside the barbed wire fence. George Takei, famous for his role as Hikaru Sulu in the original "Star Trek" series, was 5 years old when his family was forced to relocate to the mosquito- and chigger-infested, wooded swamplands of Rohwer, an experience he has called, in interviews, the most "humiliating" and "degrading" of his life. Through his personal social media outlets and various lecture circuits, Takei has remained committed to keeping what happened at Rohwer and the other nine internment camps fresh in the minds of Americans.

"It's an important part of American history," he told *The Sacramento Bee* in March 2012. "It's as important as slavery – not as long-lasting and not to as many people – but it certainly is a failure of our democracy. What was most grievously violated was the United States Constitution."

*"May the people of Arkansas
keep in beauty and reverence
forever this ground where
our bodies sleep."*

Lewis said it was an emotional experience to go to the little cemetery in the midst of cotton fields. "Ideally, I would love to see that cemetery become a National Historic Site," she said. Although it is not the only cemetery associated with an internment camp, she said, it is a significant cemetery, for the monuments and headstones, "and the creativity that went into creating them out of wood and concrete."

Erdman said the experience of mapping the cemetery has been both challenging and rewarding, and he hopes the university will stay involved in Rohwer's progress for a number of years to come.

"While the project is definitely moving in the right direction," he said, "there is still plenty of work to be done."

Stevens said it is also refreshing to see a preservation project that is purely for a landscape.

"There are historic places that don't necessarily have a building, but they have a lot of significance and are worthy of preservation, too," she said. "That's a significant piece of our history that we've forgotten, and I think it's important we remember what happened here." ■

Art From Outside the Barbed Wire

University of Arkansas art professor John Newman has a personal connection to the Japanese internment camp at Rohwer that has informed his series of paintings about the camp and the people outside. His mother's family was from Rohwer, and he lived there as a very young child. In an article in the fall 2004 issue of *Research Frontiers*, he recounted some of the stories he'd heard about Rohwer and how African-Americans, who lived under segregation, related to the Japanese-Americans, who lived behind barbed wire.

For example, he said, "My mom's family used to gather pecans. One day, she and my grandmother went up this hill, looking for the pecans, and when they came over the top of the hill, they saw the cabins where the Japanese lived. They had no idea it was there before that."

To read the article and see some of Newman's paintings



that grew out of the stories, tap into the *Research Frontiers* archives at <http://researchfrontiers.uark.edu/6283.php>.



Photo by Russell Cothren

The American Diet Surviving a Meat-Sweet Desert

By Heidi Stambuck

The three women each took the microphone in turn to answer questions: What type of fat should I avoid? What are the rules for calling a food organic? What is the biggest cause of obesity among children? How do we interpret news about nutrition and health? Are supplements safe?

Navam Hettiarachchy, Cindy Moore and Susan Patton spoke about the American diet during a Science Café sponsored by the University of Arkansas chapter of the scientific research society

Sigma Xi. Set in a local restaurant, the public event drew a roomful of people to hear Hettiarachchy, a food scientist; Moore, a dietitian; and Patton, a nursing instructor.

To the overarching question, “What is the American diet?” they offered a picture as clear as the neon glow of a fast-food restaurant menu.

Hettiarachchy referred to the Western diet as the “meat-sweet diet,” a feast of red meat, sugary desserts, bran-removed grains, high-fat dairy products, high-sugar drinks and other processed food frequently chosen by many people in developed



Photos by Russell Cothien

Dollar stores offered some foods to fill a healthy plate, as recommended by the U.S. Department of Agriculture. Choices – particularly for fruits, protein and dairy – were limited. Sugar, fat and sodium were plentiful.

countries. The high-fat, high-sugar, low-fiber, processed foods that characterize the diet of many Americans today can contribute to four of the leading causes of death in the United States, she said.

In addition, heart disease, cancer, stroke and diabetes can have other contributing factors, but diet can play an important role in the development of these chronic diseases, Hettiarachchy explained.

“However, Americans are becoming health conscious and are moving toward products that contain less fat – preferably unsaturated fat – are dense in dietary fiber, have less calories, are low in sodium, and include sugar substitutes for a healthy lifestyle,” Hettiarachchy said.

Nearly one in three American adults is obese, and estimates are that 86 percent of Americans will be overweight by 2030, she said. Arkansas is no exception, according to Moore, who directs the dietetics program in the Dale Bumpers College of Agricultural, Food and Life Sciences.

“We need to work on reducing obesity,” Hettiarachchy said. “Good nutrition has to be practiced at home. Fruit and vegetables

need to be part of the meal, and the youngsters need to be educated on eating healthy food products for a healthy lifestyle.”

Obesity is a complex problem, Patton said, and it’s easy to blame the victim.

“The solution will also have to be complex,” she said. “The problem is very costly. To get health-care costs in line in our country, we will have to address the problem of obesity.”

Education is the answer, Moore said, and education needs to cover both nutritional information and the effects that lifestyle choices can have on health. Moore and Patton prepare students for two professions that serve up that education.

Dietitians work with people in a wide range of settings: hospitals and other health-care facilities, sports nutrition and corporate wellness programs, food and nutrition-related business and industries, private practice, and community and public health settings. Dietitians are also involved in research in food and pharmaceutical companies and at universities and hospitals.

Dietitians and nurses offer clients and patients knowledge and skills while encouraging them to make lifestyle changes

to improve their health. Moore and Patton both teach their students the importance of understanding the individuals they are working with and realizing the context in which they live and the limitations they may face. Knowing what foods have the best nutritional value does not help someone who has no transportation to a supermarket where nutritious food is affordable and abundant.

Food Deserts and Food Insecurity

Many people in the state of Arkansas live in “food deserts” and may be as far as 30 or 40 miles away from the nearest grocery store or super center, Moore said. Complicating the situation even more is that they may not have their own transportation to those stores and so may be limited to shopping most often at a dollar store or quick stop.

“We must work with them within their means,” Moore said. “Students have to get out of the idealistic box that many of them come to school with. If a person can only afford to shop for groceries at a dollar store, as dietitians they will have to work with that person to teach them how to make the best decisions they can.”

Moore and Patton both talk to students about different strategies they can use to help patients and clients.

“We teach students to work with patients where they are,” Patton said. “What works for one person won’t work for others.”

Nursing students learn to assess the knowledge patients have of the health risks to which they are susceptible and what barriers to good health exist for them, she explained. The nurse helps the patient develop strategies to address those particular barriers.

“There is not one area of nursing that I can think of that does not have a nutritional component,” Patton said. “A nurse working in an intensive-care unit knows that obese people are more difficult to take care of because of co-morbidities related to their weight.”

Patton also explained that food insecurity contributes to the obesity problem in the United States because healthier alternatives to those food choices on the meat-sweet diet are more expensive. The U.S. Department of Agriculture defines household food security as “access by all members at all times to enough food for an active, healthy life.” It goes on to say that food security requires that “a minimum of nutritionally adequate and safe foods are readily available and can be acquired in socially acceptable ways, i.e. without stealing, accessing emergency food supplies, or relying on other coping strategies.”

“Arkansas has the third-highest rate of food insecurity in the United States,” Patton said.

This spring, she conducted a correlational study using data from “County Health Rankings” published by the University of Wisconsin Population Health Institute, the Centers for Disease Control and Prevention National Diabetes Survey, Feed America, and the National Center for Chronic Disease Prevention and



Slim Pickin’s at the Dollar Stores

By Barbara Jaquish

With a shopping list supplied by dietitian Cindy Moore, I set out to find dollar store food to fill the healthy-eating plate designed by the U.S. Department of Agriculture – see www.choosemyplate.com.

- Here’s the list:
- ☒ reduced-fat milk and cheese
 - ☒ whole-grain cereals and breads
 - ☒ peanut butter
 - ☒ dried beans and rice
 - ☒ canned juices – 100% juice and only in moderation
 - ☒ fruits: packed in water or juice
 - ☒ low-sodium vegetables: frozen, if possible, or drain and rinse regular canned vegetables.
 - ☐ low-sodium soups

I visited three different dollar stores in Fayetteville, Ark., read scores of labels, and came back with some nutritious food and way too much fat and sodium. I found just one low-sodium item – a can of black-eyed peas – and no reduced-fat cheese. Except for pineapple, most fruit was packed in sugary syrup. Yet, there were happy surprises. All three stores carried a variety of dried beans, rice and oatmeal. In one store I even found whole-grain brown rice and whole-wheat bread.

Note: None of the stores visited appear in the photos used in this story.



Photo by Russell Cothren

Education, exercise and eggplant: Children in this elementary school garden are learning to grow and eat a variety of vegetables. As Patton said, the physical activity is a bonus benefit.

Health Promotion. It confirmed a moderately positive association between food insecurity and obesity in Arkansas. Because of design limitations in the study, it could not be said to show causality between food insecurity and obesity, according to Patton.

“Not having access to healthy food can come from a lack of money to purchase it or a way to go get it,” she said. “Obesity is strongly associated with food insecurity, and you may think of that as a paradox. How can people who don’t have access to food be obese? It’s because they have more access to the food sold at convenience stores, food that is higher in calories but lower in nutritional value. People with access to supermarkets tend to eat better.”

Community- and school-based gardens may be a part of the solution to the problems of food insecurity and obesity, Patton said. They get children and adults working together to produce healthy food, with the added benefit of physical activity that also helps to counteract weight gain.

Researching Education

Moore is part of a team of faculty members who last year received a \$4.78 million grant for five years from the USDA’s National Institute of Food and Agriculture. The scientists and educators are taking on childhood obesity, and Moore’s responsibility is to develop and co-teach an interdisciplinary course training students about the context and prevention of childhood obesity. They examine economic and societal

ingredients in the problem, not just nutritional factors, she said. Goals of the overall project are to improve the diet and healthy behaviors of children, especially those at risk of obesity, and equip educators, child-care providers and other practitioners to tackle the childhood obesity crisis.

Researching Answers

Both the nursing and dietetics students and faculty pay close attention to the latest research in a variety of health-related areas. Some of the information they will use in their practice may come from Hettiarachchy and her students in food science, who are researching several innovative, new products to address the need for food preservatives and reduce sodium content in foods. Sodium in processed foods is often a culprit in high blood pressure and other health conditions.

“We want to develop products that are low in calories, dense in protein, gluten-free, natural, have low sodium to reduce hypertension, and high in dietary fiber,” Hettiarachchy said. “Nowadays, because most food consumed is refined, people do not get the dietary fiber their bodies need.”

“Food companies are researching low-sodium alternatives and looking for substitutes,” she continued. “They tried potassium but it can contribute bitterness to the final product that did not attract the consumer. The food has to be tasty or people won’t consume it. There is a tremendous amount of research going on in finding sodium substitutes.”

Hettiarachchy is the bench scientist of the group of three Science Café presenters. She studies proteins and bioactive peptides that have anti-diabetic and anti-obesity properties.

Her work also involves adding value to residual products from industry that can be used to increase dietary fiber and nutrients in foods. Rice bran and soybean meal are left over during processing of rough rice and soybean. She and her research team use consumer-friendly fermentation technology to use that inexpensive rice bran and soybean meal to produce yeast, antioxidants, pre-biotics and dietary fiber.

“Our research in rice and soybean proteins has brought a lot of visibility on national and international levels,” Hettiarachchy said.

“Our rice bran fermentation innovative research led to filing of a patent and the start-up of Nutraceutical Innovations LLC.”

She coaches teams of students who have won regional and national competition awards for new and innovative healthy food products in the Institute of Food Technologists and various others at the national level. The competitions provide students hands-on experience and an opportunity to learn to be leaders and to be creative and innovative to solve problems in a practical way, she said.

“Many will go into product development with food companies after they graduate and be very successful with their careers,” Hettiarachchy said. “We know consumers want convenient, tasty food that is cheap, highly nutritious and safe.” ■



Susan Patton



Navam Hettiarachchy



Cindy Moore

Photos by Brooke McNeely

Science Café: Questions Answered

What are the rules for calling a food organic?

Hettiarachchy: Organic foods are produced using methods that do not involve modern synthetic inputs such as synthetic pesticides and chemical fertilizers, do not contain genetically modified organisms, and are not processed using irradiation, industrial solvents, or chemical food additives. Organic food production involves a set of production standards for growing, storage, processing, packaging and shipping that include:

- No synthetic chemical inputs (fertilizer, pesticides, antibiotics, food additives, etc.)
- Use of farmland that has been free from synthetic chemicals
- Maintain strict physical separation of organic products from non-certified products
- Undergo periodic on-site inspections
- All organic produce are certified

What type of fat should I avoid?

Hettiarachchy: Trans fatty acids, or trans fat, formed during food processing. A food manufacturer can list 0 percent trans fat on a food label if the amount of trans fat it contains is less than 0.5 grams of trans fat per serving.

Are supplements safe?

Hettiarachchy and Moore: Always consult a health

professional before taking a supplement. Some interfere with medications and others can build up to toxic levels. A well-balanced diet will supply all of the nutrients the human body needs, eliminating the need for most supplements.

What is the biggest cause of obesity among children?

Patton: In the case of Arkansas, it is not a rich state; 28 percent of children live below the poverty line so their parents often may have to buy energy-dense foods that are not as nutritional as low-fat, low-sugar foods. Many children don’t get sufficient exercise because they spend more time inside at home and at school than children did in the past, whether it’s because they play video games and watch television for fun or they live in a neighborhood where it is not safe for them to play outside.

How do we interpret news about nutrition and health?

Moore and Patton: Health professionals such as dietitians and nurses must help people understand the basic principles of nutrition and how to read food labels. If the label contains ingredients your grandmother would not have known about or more than seven ingredients, consider a different choice. Understand that two reasons people don’t trust news about nutrition, diet and health is that they want to be told to take a pill to achieve good health and that the news is often sensationalized to keep people watching through commercials.

First there was one: Seeking

the Roots of Multicellularity

By Melissa Lutz Blouin

Life used to be so simple.

Back more than a billion years ago, it consisted of just one cell. It might have had a nucleus – or not. It was absolutely microscopic.

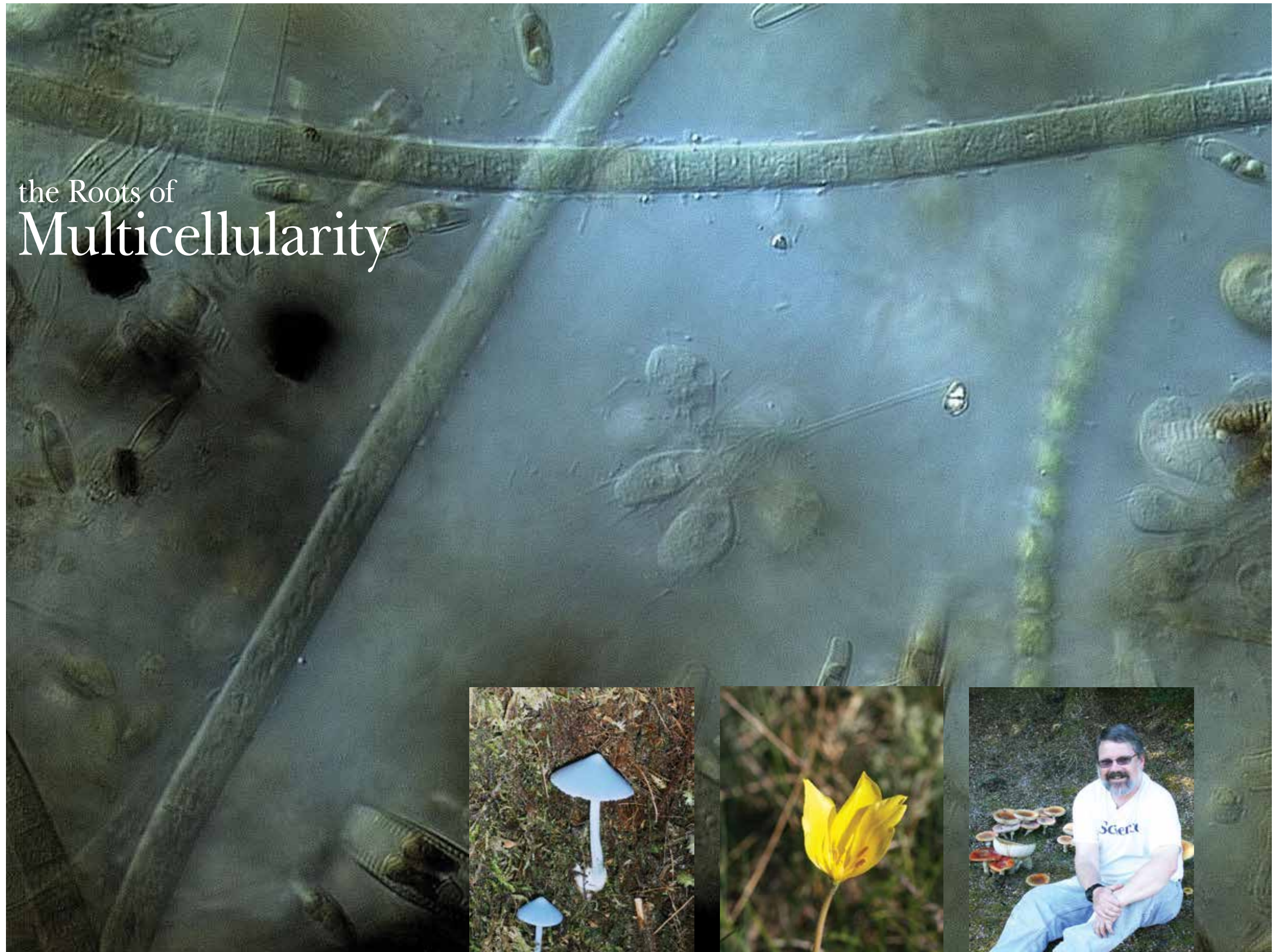
And then, over time, life became more complex. And its complexity was not as simple as one might think.

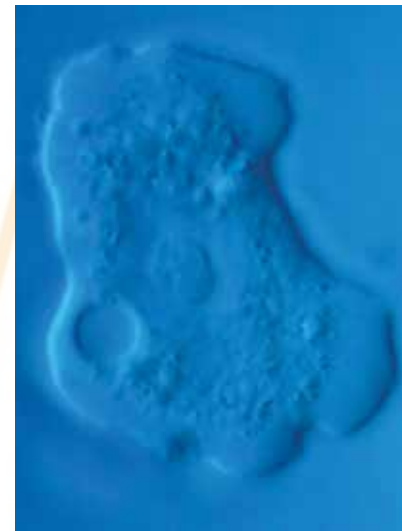
“There are multiple ways of being multicellular,” said Fred Spiegel, professor of biological sciences in the J. William Fulbright College of Arts and Sciences. Spiegel, in addition to being a multicellular animal known as a human, studies slime molds, fungi and a group of microorganisms known as protists. His work has led him to contemplate questions of how life forms relate to one another. One day recently, he answered questions about the origins of multicellularity.

Multicellularity occurs in many different ways in nature. In animals, a fertilized egg goes through embryonic development. In the same biological group as animals, some fungi form complex multicellular structures like mushrooms and other tissues. Even within the fungi, multicellularity happens in many different ways: some fungi live as individuals but come together cooperatively to form a multicellular mass called a fruiting body.

“It’s unlikely that there was ever one thing that you could call multicellularity,” Spiegel said. Its origins remain obscure, but the sheer prevalence of it in different forms suggests its success.

While multicellular organisms have succeeded in surviving, an even greater variety of single-celled organisms still thrive. Spiegel sees a human-centric drive towards the study of large multicellular organisms, with plants and animals at the top and single-celled creatures near the bottom of the interest spectrum, despite the fact that our own body mass contains more single-celled organisms than human cells. Your body plays host to around 100 trillion bacteria, as well as fungi and single celled anaerobic organisms called archaea. At this point, scientists know very little about the microscopic creatures that inhabit our bodies.





Choanoflagellates are a group of free-living unicellular organisms that can also form colonies. Some scientists think they are the closest living relatives of animals. Scientists like Fred Spiegel believe that multicellularity, found in plants, fungi and humans (see below), evolved multiple times in different ways.

“We’re big, we’re complex, we’re multicellular, and therefore we think we must be important” in the biological scheme of things, Spiegel said. “But you’ve got to take the pride out of multicellularity to see what it means.”

Scientists seek to know more about the origins of multicellular organisms by examining the relationships between the organisms and building “trees” that show their relationships, then mapping the characteristics of these organisms on the trees and refining the relationships between them. Spiegel and his colleagues have shown that multicellularity has evolved independently in different groups, including a species in a group where it previously was not known before.

In the most widely distributed multicellular lifestyle, practiced by cellular slime molds, individual cells come together to form a complex “fruiting body.” However, this innovation occurs in organisms besides slime molds, including an amoeba called *Guttulinopsis vulgaris* studied by biologist Jeff Silberman and former graduate student Matt Brown. This amoeba represents the only known species in its particular branch of the tree of life that exhibits this form of multicellularity, offering yet another clue

to how multicellular organisms evolved. This clue suggests that figuring out the origin of multicellular organisms grows ever more complex.

The problem is that these trees can only go so far back. Scientists can look at certain structures and processes that organisms have in common, such as multicellularity or sex, to determine what the last common ancestor would look like. For instance, consider eukaryotes, which are organisms with cells that contain complex structures in membranes. Since all eukaryotes reproduce sexually, then it seems likely that the last common ancestor of eukaryotes reproduced through sex. However, because biologists can’t know what processes or structures might have existed in extinct organisms, they can’t be certain of the exact origins of a particular trait, such as becoming multicellular.

“We can figure out what the last common ancestor of a certain lineage might look like, but we don’t know what was there before that,” Spiegel said. “We don’t know how something got to the point of being the last known common ancestor.”

Scientists do know, however, that multicellular processes evolved separately in different organisms at different times.

“The ‘final products’ – animals, plants, fungi and amoebae, among others – indicate independent origins” for multicellularity, Spiegel said.

Also, multicellular organisms do have some similarities, in that chemical signals bring cells together to create life in its different forms. You can also see this responsiveness to the environment in unicellular organisms.

“Unicellular creatures will go towards food or light, and move away from noxious substances,” Spiegel said.

The origins of multicellularity will remain obscure far into the future. In the meantime, scientists like Spiegel, a mycologist specializing in slime molds, will continue to slowly piece the picture together. Spiegel is an advocate for the unseen, a champion of an under-examined world of biology that exists outside of animals, plants and pathogenic microorganisms. Some day he hopes to write a basic biology textbook that emphasizes the microscopic world.

As he sees it, “Mammals are just one small example of the different ways you can be alive.”

Sex and the single cell

By Melissa Lutz Blouin

“All you mycologists ever think about is sex,” commented one of biologist Fred Spiegel’s students after taking one of his classes. Spiegel wishes that more biologists thought about sex, but in a universal way.

“Animals are poor models for understanding the universal aspects of sex,” Spiegel said in a commentary for the *Proceedings of the Royal Society*. Plants have sex. Insects have sex. Fungi have sex. What sex boils down to, according to scientists, is a special type of cell division that creates the reproductive cells known as sperm and egg cells in plants and animals. Following that, the reproductive cells from two cell nuclei come together and fuse, which is fertilization. That’s all you need.

Sex only occurs in eukaryotes, organisms with cells that contain complex structures enclosed in membranes. Scientists don’t know if sex happens in all species in this domain, however.

“The absence of the observation of sex is not the same as the absence of sex,” Spiegel said. “If one learns to ‘think about sex all the time,’ one may be more likely to find it.”

Spiegel cites slime molds, also known as fruiting amoebae, as an example. Once biologists carefully examined the life cycles of certain types of slime molds, they found evidence of sex.

Organisms that reproduce asexually may also offer clues to those that reproduce using sex – especially if some strains of those organisms do both. In one major group of amoebae, known as plasmodial slime molds, one set reproduces using sex and the other does it without. Looking carefully at these biological processes could help scientists learn to recognize sex when they see it elsewhere.

“If we really want to think critically about sex in the most general sense, amoebae can tell us a lot that we can use to develop those generalizations,” Spiegel said. “They can relieve us of the animal-based biases about sex.”

“Looking carefully at these biological processes could help scientists learn to recognize sex when they see it elsewhere.”



Photo by Nate Allen

FROM VISION TO SECRET SAUCE

By Matt McGowan

BUSINESS START-UP TEAM PITCHES A BETTER WAY TO STOCK STORE SHELVES.



Since 2006, the entrepreneurship program in the Sam M. Walton College of Business has produced six companies that employ more than 100 people, most of whom work and live in Arkansas. Over the past decade, even before the formal program began, director Carol Reeves has advised 15 national, first-place-winning business-plan teams that have won more than \$1.3 million in cash prizes. The competitions, which take place all over the country – as well as in Canada and Great Britain – connect start-up companies with investors.

One such start-up is SpatiaLink, a company dreamed up by five business students: Nate Allen, Steve Fortner, Bethany Haefner, Aaron Huffaker and John Miller. The students conceived SpatiaLink as a business idea while in a graduate-level entrepreneurship class taught by Reeves.

At the very root of SpatiaLink are algorithms. The challenge retailers face is to keep store shelves stocked with the products people are buying, and to place those products on the shelves based on sales performance. To do this, SpatiaLink team members combined three things – widely used shelf-planning software, consumer information from Nielsen ratings and raw sales data – to develop algorithms that increase efficiency in the retail supply chain and optimize space planning on store shelves.

In other words, once the algorithms are integrated into a software tool, SpatiaLink will “put the right product in the right place at the right time.”

This story follows the SpatiaLink team as it prepares for and participates in two major business-plan competitions, the Donald W. Reynolds Governor’s Cup in Little Rock and the Rice Business Plan Competition in Houston.

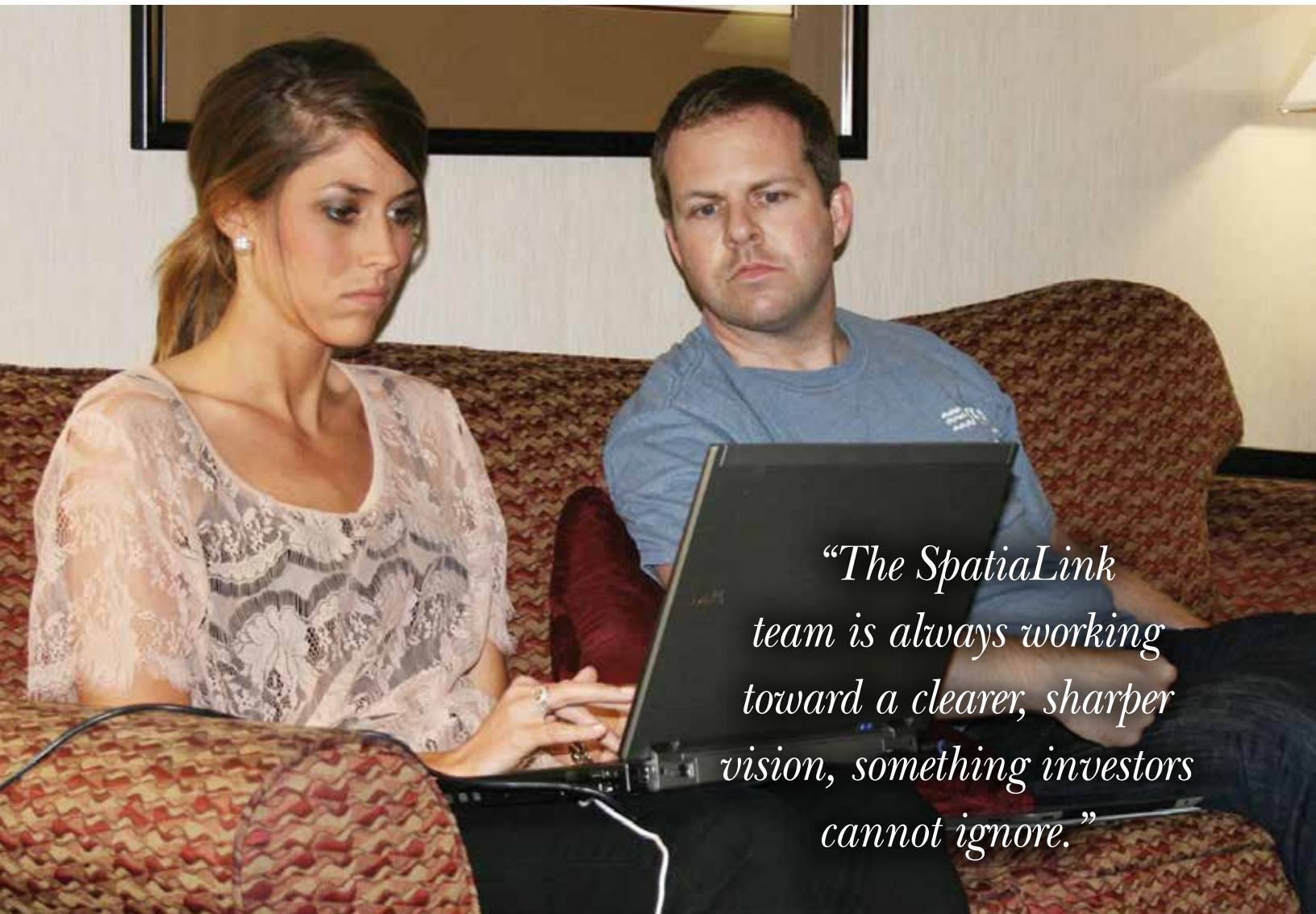


Photo by Matt McGowan

It's late. Bethany Haefner and Steve Fortner revise that central metaphor that just isn't working.

Thursday, March 29, 2012

The lighting in this room is bad. It's those incandescent bulbs behind cheap Plexiglas. And there are no windows, so if you don't have a watch, you have no idea whether it's 11 a.m. or 11 p.m. It is the latter, and everyone is tired. The SpatiaLink team and Reeves have gathered in this small hotel conference room in Little Rock to discuss strategy and do a practice run. The Arkansas Governor's Cup is tomorrow, and SpatiaLink presents at 8:30 a.m. Tomorrow they will have 35 minutes, 20 for a presentation in which all team members will participate and another 15 for questions.

They don't have a projector, so they use a small laptop to go through a series of slides as the team members deliver their respective pieces of the overall presentation. Despite the hour and their wilting state, the presentation goes smoothly, with only minor hiccups.

Reeves starts the post-mortem. "You were 20 seconds too long," she says. "But I think you'll talk faster tomorrow." There are other suggestions, most having to do with word choice, syntax and

emphasis. The team members know they need to change a central metaphor that just isn't working.

It is late, but they keep going. They've been doing this for months – five total – crafting and editing the script, memorizing it, listening to criticism, editing and refining and practicing and doing it all over and over again, always working toward a clearer and sharper vision, a compelling pitch, something investors cannot ignore.

Friday, March 30, 2012

It is 7:45 a.m., and they are in the hotel bar. It's the only private place for another practice run. They go before the judges in 45 minutes.

They run through the presentation. Despite the night's rest and their crisp appearance – they are all wearing gray or black suits, and the men have on ties – it doesn't go well. In fact, it is a step back from last night. But they don't dwell on this.

Reeves' critique focuses on the details. "Continue to talk to the audience when you're introducing the next speaker," she says.

She warns them about a few new judges, who she says are tough but fair. And then she finishes her critique with a comment that will prove prophetic. These new judges will be good, she says, "fresh eyes for Rice, because Rice judges don't know retail."

Fifteen minutes later, they are at the head of the room, in front of lights and several rows of tables. Friends and family members and more judges file in. Reeves sets up a camera. Game film. Other competitors chatter out in the hallway. At the front of the room, the team members shuffle around each other and get into place. They are smiling, shaking hands with judges. No nerves here. They are relaxed and confident, and just everything goes smoothly. When the presentation is finished, everyone is smiling.

Wednesday, April 11, 2012

The Governor's Cup Luncheon includes a 90-second elevator pitch from each team and the announcement of awards, which are based on the business proposal and the earlier presentation.

Haefner delivers the short presentation and soars. SpatiaLink wins the elevator pitch but, somewhat surprisingly, takes second in the competition. They are disappointed, but there's no time to brood. Tomorrow they fly to Houston for the big show in front of big money. Texas money.

Thursday, April 12, 2012

Held at Rice University, the Rice Business Plan Competition is the largest and richest competition of this sort in the world. This year, sponsors will dole out more than \$1.5 million in prize money.

The award money at Rice and the competition itself are important, no doubt, but they are not the sole or even primary objective of the 40 or so teams chosen from an applicant pool of about 1,600. The real goal is to find an investor.

In the 12-year history of the competition, the University of Arkansas has placed more teams in the finals than any school other than the University of Michigan. This places Reeves' teams above powerhouses, such as Harvard, MIT and The University of Chicago.

Reeves and team members huddle in a hotel room. They have work to do: the presentation must be overhauled. Earlier, during a practice round, they got hammered by judges. After listening to the judges' critique, team members realize the presentation assumes too much. It's what Reeves was talking about back in Little Rock. Haefner nails it: "They essentially just don't get retailing. It's a different world down here."

One major change: Based on judges' suggestions, only three people will present. So, they build a new presentation with different illustrations, and they settle on a dramatically different

script that the three presenters – Fortner, Haefner and Huffaker – have to memorize.

Friday, April 13, 2012

It was a long night, and yet early the next morning, they're back in the same room going through it again, for the 468th time, although this version looks and sounds nothing like the one from two days ago. The room is strewn with coffee cups and spent food wrappers, papers and files and shoes and battery cords and six laptops, Miller operating two of them. The team members are in various stages of dress, most of them shoeless, some of the men without ties.

In the hotel elevator on the way over to Rice, while team members nervously chat, Reeves offers more suggestions, mostly having to do with style and delivery, a little emphasis here or there. The ensuing presentation goes well, especially considering the overnight overhaul and the need to memorize new parts. They roll through the script and slides with barely a glitch. The judges are smiling. They respond warmly to Haefner's enthusiasm and chuckle when Fortner refers to Bentonville as "the Silicon Valley of retail."

But the Q&A session is a different story. The judges probe. How does the software work? How are the algorithms integrated? Team members grope for words, and when the right language doesn't come, their answers sound vague and dismissive. But the judges don't let up. As they persist and the team members continue to struggle, a predatory energy fills the room, and the wheels just seem to spin off the axle.



Photo by Nate Allen



Photo by Nate Allen

*“SpatiaLink will put
the right product
in the right place
at the right time.”*

One of the judges puts it plainly. “I understand the problem,” he says. “You’ve got these big silos of data, and they need to communicate, but I still don’t see how you’re going to bridge the silos.” This comment strikes a nerve, and the room buzzes with a collective grumbling that sounds like British Parliament. And then the voice of a different judge rises above the hum. “Right,” this one says, “just tell us what’s in the sauce. What’s the secret sauce?”

Ten minutes later, in a windowless cell that can’t be more than 100 square feet, the SpatiaLink team convenes and tries to figure what went wrong. Reeves doesn’t hold back. She praises the team for the presentation and the work and time they put in to changing it radically. But then she really digs in and picks apart their performance during the Q&A. The answers were too long, she says, too wordy and not on target. If the judges appeared annoyed, they were.

“And that secret sauce thing,” she says. “That is so critical. You need to show how you link the data. That’s what they were asking you. Someone needed to step up and say, ‘We take data from JDA and RSi and run it through our algorithms to create a more optimized shelf-planning model.’ That’s it. Just answer the question.”

That afternoon team members find out that SpatiaLink did not make the semifinal cut. They are disappointed but far from defeated. They know they have something that will make a business, but they just haven’t yet reached that critical place where they can show others what they see.

During the consolation “Shark Tank” round, in which judges are allowed to interrupt the presentation at any point to ask a question, the team members are much more relaxed. They are smiling and engaging the judges, and they are saying all the right things. Most importantly, the judges – some of whom are also investors! – are beginning to get it, and there is an almost palpable sense that they like what they see, that they too know SpatiaLink will succeed.

After team members answer more targeted questions, the judges also begin to understand the tool, the “sauce,” as they put it. There’s a lot of data out there, mountains and mountains of data, shelf-space-planning data, consumer-demographic data, raw-sales data from the retailer and, finally, supply-chain data from the University of Arkansas researchers. Currently, no company or product combines these data to optimize shelf planning.

The judges get it.

SpatiaLink loads all these data into one spreadsheet, mashes the data together and spits out a shelf-planning model that will reduce out-of-stock items by 25 percent and save retailers billions of dollars every year.

Now they just need some money to pay engineers to convert the spreadsheet into software.

“And that’s where you come in,” says Huffaker. ■

For a further account of the SpatiaLink team’s long night preparing for the Arkansas Governor’s Cup: <http://researchfrontiers.uark.edu/17103.php>.



Photo by Matt McGowan

The SpatiaLink team

Nate Allen, *chief information officer*

Allen manages software development and the outsourcing of SpatiaLink’s cloud computing and database management components. He also manages all in-house technology requirements.

Steve Fortner, *chief product officer*

Fortner manages product-related decisions, including conception, development and extension.

Bethany Haefner, *chief business development officer*

Haefner coordinates sales and marketing functions, including facilitating product development and implementation and developing high-level contacts with current and prospective customers and employees.

Aaron Huffaker, *president & chief executive officer*

Huffaker is responsible for strategic planning, developing and maintaining relationships with key stakeholders and partners, and coordinating decisions/building consensus across the information technology, business development and finance departments.

John Miller, *chief financial officer*

Miller is responsible for financial management, controller and accounting functions.



Photo by Russell Cothren

The mentor

Carol Reeves holds the Cecil and Gwendolyn Cupp Endowed Applied Professorship in Entrepreneurship and is associate vice provost for entrepreneurship and management professor in the Sam M. Walton College of Business. She directs the Walton College entrepreneurship program.



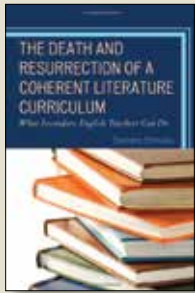
**Opening Doors:
The Early Netherlandish
Triptych Reinterpreted**

Lynn F. Jacobs
Pennsylvania State University Press

In the first comprehensive interpretation of the early Netherlandish triptych, art history professor Lynn Jacobs examines the evolution of the triptych from medieval to early modern paintings in the region of present-day Belgium and Holland.

The term “triptych,” meaning a painting or relief carving on three panels, typically hinged together so that the side panels could open and close, did not exist during the period covered in Jacobs’s book. Contemporary French, German and Latin documents refer to the form as “a painting with doors.”

The doors or wings can both separate segments and emphasize thresholds from one area to another, whether interior or exterior, center panel or side wings. The triptych format, according to Jacobs, requires the artist to deal with multiple boundaries in constructing meaning within the work.” Her purpose is “to examine how each triptych manipulates the format ... to create different meanings.”



**The Death and Resurrection of a
Coherent Literature Curriculum:
What Secondary English Teachers Can Do**

Sandra Stotsky
Rowman & Littlefield Education

Using data from a national survey of high school English teachers she conducted in 2010, education researcher Sandra Stotsky describes an incoherent secondary literature curriculum that fails to increasingly challenge students through high school, particularly those in the “wide middle band,” the 50 to 60 percent who are not in Advanced Placement classes but work hard and will graduate. Many of these students will struggle in college and face remedial work because they are ill-prepared for higher-level reading and writing.

In addition to tracing the historic shifts, educational movements and societal changes that led to the nation’s secondary literature curriculum current state, Stotsky provides five principles to undergird coherence in a literature curriculum and cites examples of some schools that have developed high-quality curricula.

A critic of the new Common Core national education standards, Stotsky offers some insight into how teachers and curriculum developers might build a coherent sequence of texts for study. Stotsky holds the Twenty-first Century Chair in Teacher Quality.



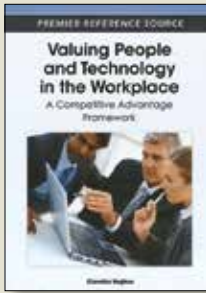
**Handbook of Sustainability
for the Food Sciences**

Ruben O. Morawicki
Wiley-Blackwell

Food science professor Ruben Morawicki addresses the urgent challenge of worldwide food security in his comprehensive guide to the environmental impacts of food production. The book includes topics such as the supply chain, energy, water, transportation, emissions and packaging. It also covers management issues such as life-cycle assessment, efficiency and environmental claims and reporting.

“Food sustainability is one of the most important challenges the world will face over the next decade,” Morawicki said. “We have fewer materials and less energy and water for food production. Other resources, such as fish, are being extracted at such a high rate that they’re dangerously depleted. These declining resources, combined with an ever-increasing population, mean that without immediate, meaningful and sustained action, we will suffer widespread food shortages. Parts of the world are already experiencing this.”

Although the *Handbook of Sustainability for the Food Sciences* is a guide for food science professionals, it is written in accessible language and will appeal to anyone who cares about food security.

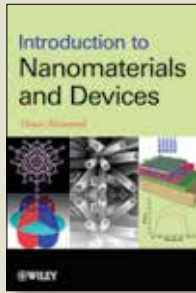


**Valuing People and Technology
in the Workplace:
A Competitive Advantage Framework**

Claretha Hughes
IGI Global

In *Valuing People and Technology in the Workplace*, Claretha Hughes, an associate professor of human resources, proposes a framework that will allow managers to get the most out of their workers by valuing them on a level equal to their technology. During her two decades working in the corporate world, Hughes noticed that as technology and machines became a growing part of the workplace, the people who work around the machines, operate the machines and perform maintenance on the machines became undervalued.

She developed the “Hughes Value Creation Model for Organizational Competitive Advantage” based on five values related to work and three organizational perspectives. In her experience, the model can help companies improve productivity by emphasizing the importance of the human worker. This is not a book about how people should be more like machines, she says. It is a book that tries to help employers and managers value their employees the same way they value the machines, instruments and tools that make up their company.



**Introduction to Nanomaterials
and Devices**

Omar Manasreh
John Wiley and Sons

Introduction to Nanomaterials and Devices begins engagingly: “Investigating materials and devices at the nanoscale level has become the topic of discussion in our daily life even at the dinner table.” From there, electrical engineering professor Omar Manasreh goes on to offer a comprehensive guide to nanotechnology that introduces the basic concepts of nanomaterials and the devices that are built from these materials. The book covers the development of semiconductor nanomaterials, semiconductor thin films and bulk semiconductors, and provides an introduction to quantum mechanics theory and how that theory applies to optical and electrical properties of nanomaterial structures.

Manasreh’s book describes new phenomena through the concepts of conventional physics. It introduces fundamental nanomaterial concepts and devices that have been developed from these concepts. The fundamental properties of semiconductors and nanomaterial systems, including quantum dots and wires and quantum structures, such as single and multiple quantum wells, are also covered.

The book is both a textbook and a reference tool for practitioners and researchers exploring nanomaterials.

More Books on the Web

**Thomas Hart Benton
and the American Dream**

Leo G. Mazow
Pennsylvania State University Press



Leo Mazow, an associate professor of art history, explores Thomas Hart Benton’s populist goals,

preserving in paint the voice and sounds of the folk. Details: http://bit.ly/American_Sound

**Debatable Humor:
Laughing Matters on the 2008
Presidential Primary Campaign**

Patrick A. Stewart
Lexington Books



In *Debatable Humor*, political scientist Patrick Stewart presents the first systematic observational analysis of the humor used by political

candidates. Top of Form “Laughing matters on the campaign trail, not only for bringing supporters together but also for defining leaders,” Stewart said. For more: <http://bit.ly/DebatableHumor>

**The FSG Book of Twentieth-Century
Italian Poetry, An Anthology**

Geoffrey Brock, ed.
Farrar, Straus and Giroux



Poet and translator Geoffrey Brock’s collection presents the work of Italian poets in context with translations by noted poets.

Question:

What makes a plant native?

Garry Vernon McDonald, assistant professor of horticulture, Dale Bumpers College of Agricultural, Food and Life Sciences, replies:

Pity plants can't read. It would make the work of plant scientists easier. However plants refuse to be labeled and are content to get on with whatever they are doing. As such, pigeonholing plants into "native" and "non-native" categories is somewhat arbitrary.

It all comes down to geographic or spatial scale. Are we talking about native to planet Earth or native to your backyard? Biological and social scientists have differing criteria when deciding this issue. A common definition of a native plant in the United States is one that was growing *in situ* prior to the Age of Discovery, when modern sailing ships and celestial navigation made the worldwide transport of plant material possible. This might work for insular pre-colonial America, but how does this work for the rest of the world? Indigenous peoples in the Americas were spreading plants around



way before strangers showed up on the beach.

A working definition of a native plant might be a plant species that evolved in a defined geological time frame and is growing and reproducing in a specific geographical area. This definition has holes, as migrating birds and other animals readily spread plants around, and seed can sail the ocean blue.

Obviously, native plants are not easily defined. We horticulturists practically speak of native plants as those found growing and reproducing locally – define locally for yourself – and were not introduced by man. Can an introduced plant

ever be considered native? A plant that has survived locally and reproduced itself over a long time period but is not necessarily invasive is commonly referred to as a naturalized plant. They are not strictly native, since they did not evolve there, but certainly have made themselves at home with minimum impact on the landscape.

The common dandelion, thought to be native, is actually naturalized from Eurasia. Invasive plant species that can harm ecosystems can naturalize and dominate an area over time. I suppose if a plant remains long enough in an area and evolves, then by definition it eventually would become a native.



Question

What is a geologic fault?

In this Research Frontiers Q&A Video, Gregory Dumond, assistant professor of geosciences, J. William Fulbright College of Arts and Sciences, stands on the earth's crust and explains how the three types of geologic faults go slip-slidin' along. Scan or visit: <http://bit.ly/GeologicFault>

Question:

What are nanocrystals?

Omar Manasreh, professor of electrical engineering, College of Engineering, and director of the Optoelectronics Laboratory, replies:

Nanocrystal is a term given to a cluster of atoms the size of a fraction of a micrometer in diameter – less than 100 nanometers. The remarkable thing about these clusters is that they possess a perfect crystalline structure with a very low defect density as compared to their solid counterparts. On the other hand, the properties of nanocrystals are very close to the atomic properties, and in many cases these nanocrystals are called atomic designers. Nanocrystal usually refers to those clusters made of semiconductor atoms, such as silicon and gallium arsenide, while the term nanoparticle refers to clusters of metallic atoms, such as gold and silver. The size of the nanoparticles is usually larger than that of nanocrystals. Nanocrystals have attracted a huge technological interest since many of their optical, electrical and thermodynamic properties show strong size dependence and can therefore be controlled through careful manufacturing processes. The most well-known devices fabricated from nanocrystals are photovoltaic devices, or solar cells. These nanocrystal-based devices are expected to be inexpensive and could be used for mass production.